CLAIMS:

1.   A method comprising:

taking a first x-ray view and a second x-ray view of a patient's breast compressed and immobilized between a breast platform and a breast plate having a biopsy opening, using a digital x-ray receptor, each of said views being taken from a different angle relative to the breast platform;

displaying a first image derived from the first view, selecting a location on the first image with a target symbol, and computer-generating a pair of coordinates related to the selected location;

computer-processing the pair of coordinates to generate information that defines a first conceptual line in space passing through a target in the breast related to the selected location in the first image;

displaying a second image derived from said second view, selecting a first marker line symbol on the second image, and computer-generating a first single coordinate related to the selected first marker line symbol on the second image;

computer-processing the first single coordinate to define a first conceptual plane that passes through the breast and intersects said conceptual line at a first intersection; and

controlling a needle guidance stage relative to the breast in accordance with positional information related to said first conceptual line and first conceptual plane.

2. A method comprising:

taking a scout x-ray view and a first stereo x-ray view of a compressed and immobilized breast of a patient using an x-ray receptor;

displaying a scout image derived from the scout view, selecting a location on the scout image with a target symbol, and computer-generating a pair of coordinates related to the selected location;

computer-processing the pair of coordinates to derive information related to a first conceptual line in space that passes through a target in the breast related to the selected location in the scout image;

displaying a first stereo image derived from said first stereo view, selecting a first marker line symbol on the stereo image, and computer-generating a first single coordinate related to the selected first marker line symbol on the first stereo image;

computer-processing the first single coordinate to derive information related to a first conceptual plane that passes through said target in the breast and intersects said conceptual line at a first intersection; and

controlling a needle guidance stage relative to the breast in accordance with positional information related to said first conceptual line and first conceptual plane.

3.   A method as in claim 2 including taking a second stereo x-ray view, displaying a second stereo image derived from the second stereo view, selecting a second marker line symbol on the second stereo image, computer-generating a second single coordinate related to the selected second line symbol, computer-processing the second single coordinate to derive information related to a second conceptual plane that passes through said target in the breast and intersects said first conceptual line at a second intersection, wherein said controlling step comprises controlling the needle guidance stage relative to the breast in accordance with positional information regarding each of said conceptual line, first conceptual plane and second conceptual plane.

4.   A method as in claim 3 in which said first and second conceptual planes intersect at a second conceptual line, and said controlling of the needle guidance stage in accordance with positional information regarding the first conceptual line and the first and second conceptual planes comprises controlling the needle guidance stage in accordance with positional information regarding the first and

second conceptual lines.

5.   A method as in claim 4 including computer processing positional information regarding said first and second conceptual lines to find a least distance between the first and second conceptual lines, and providing a live display of information regarding said least distance,

6.   A method as in claim 5 in which the controlling comprises controlling the needle guidance stage in accordance with positional information regarding said least distance.

7.   A method as in claim 6 including selecting at least one of a new location on the scout image and a new marker line symbol on at least one of the stereo images and computer-processing information related to the new selection, wherein making the new selection comprises using information from said live display of said least distance.

8.   A method as in claim 7 in which making new selections comprises making new selections to reduce said least distance.

9.   A method as in claim 8 comprising inputting information regarding additional targets and computer-processing said information to provide information for controlling the needle guidance stage in relation to said targets.

10.   A method as in claim 2 comprising inputting information regarding additional targets and computer-processing said information to provide information for controlling the needle guidance stage in relation to said targets.

11.   A method as in claim 10 wherein at least the upper body of the patient is prone while said x-ray views are taken.

12. A method as in claim 10 wherein the upper body of the patient is upright while said x-ray views are taken.

13. A method comprising:

taking a scout x-ray view and one or more stereo x-ray views of a compressed and immobilized breast of a patient using a digital x-ray receptor to receive x-rays passing through the breast;

displaying a scout image derived from the scout view and one or more stereo images derived from respective one or more stereo views, on a computer monitor;

selecting a location on the displayed scout image with a manually controlled first symbol displayed on the scout image;

computer-generating two-dimensional information regarding the selected location on the scout image;

selecting a plane crossing at least one of the one or more stereo images with a second symbol displayed on the at least one stereo image;

computer-generating one-dimensional information regarding the selected plane;

computer-processing the two-dimensional information from the scout image and the one-dimensional information from the at least one stereo image to produce three-dimensional information regarding a target in the breast related to both said two-dimensional and said one-dimensional information; and

providing information regarding the target to a needle guidance stage and controlling the needle guidance stage accordingly.

14. A method as in claim 13 wherein at least the upper body of the patient is prone while said x-ray views are taken.

15. A method as in claim 13 wherein the upper body of the patient is upright while said x-ray views are taken.

16. A method as in claim 13 in which the step of selecting a plane comprises selecting a plane from only a single stereo image.

17. A method as in claim 13 in which the step of selecting a plane comprises selecting a respective plane from each of at least two stereo images.

18. A method as in claim 17 wherein said computer-processing comprises producing three-dimensional information regarding at least two targets in the breast, and further comprises displaying information relating to the two targets and responding to a selection of at least one of a different location on the displayed scout image and a different plane on at least one displayed stereo image to change the displayed information relating to the two targets.

19. A method as in claim 15 comprising inputting information regarding additional targets and computer-processing said information to provide information for controlling the needle guidance stage in relation to said additional targets.

20. A method as in claim 19 wherein at least the upper body of the patient is prone while said x-ray views are taken.

21. A method as in claim 19 wherein at least the upper body of the patient is upright or while said x-ray views are taken.

22. A method of orienting a needle guidance stage relative to a compressed and immobilized breast of a patient and controlling needle depth for insertion into the breast using two-dimensional information regarding an area of interest seen in a scout view x-ray image of the breast and one-dimensional information regarding an area of interest seen in each of one or more stereo x-ray images of the breast, comprising:

using an x-ray source and a digital x-ray receptor to image a compressed and immobilized breast of a patient in a scout view and one or more stereo views;

displaying a scout image derived from the scout view and one or more respective stereo images derived from said one of said one or more stereo views, and deriving two-dimensional information regarding an area of interest seen on the scout view and one-dimensional information regarding an area of interest seen on said one or more stereo images;

computer-processing the two-dimensional information from the scout image and the one-dimensional information from each of the one or more stereo images to position a needle guidance stage relative to the breast and control needle depth for insertion into the breast.

23. A method as in claim 22, wherein the information derived from the scout view and each stereo view defines at least two targets or loci of targets in three-dimensional space in the breast, and said computer processing includes calculating and displaying a least distance between at least two of said targets or loci, and deriving new information regarding the areas of interest from at least one of said scout and stereo images and computer-processing the newly derived information to calculate a new set of targets or loci and at least one new, reduced least distance.

24. A method as in claim 22, including deriving two-dimensional information from at least one of the stereo views, and wherein said computer-processing of information from the scout image and the one or more stereo images comprises calculating at least two targets or loci of targets, and further calculating information regarding at least one least distance between said targets or loci and providing a display of results related to the least distance calculation.

25. A method as in claim 24 in which said display of results comprises information defining a current value of said least distance.

24

26.   A method as in claim 25 in which said current value in the display of results changes in response to newly derived two-dimensional or one-dimensional information.

27. ·   A method as in claim 26 wherein at least the upper body of the patient is prone while said x-ray views are taken.

28.   A method as in claim 26 wherein at least the upper body of the patient is upright while said x-ray views are taken.

29.   A method comprising:

taking two stereo x-rays views of a compressed and immobilized breast of a patient;

displaying two stereo images derived from said two stereo views;

marking a location on each displayed image related to an abnormality seen on each;

computer-generating two pairs of coordinates, each pair related to a respective one of the marks;

computer-processing the two pairs of coordinates to calculate positional information related to a pair of conceptual lines passing through the breast and to calculate a least distance between the lines;

providing a live display of information related to said least distance;

re-marking at least one of the displayed images to produce a new set of pairs of coordinates and using said new set in said computer-processing to calculate and display a new least distance, and selectively repeating said re-marking and computer-processing of new sets of pairs to reduce said least distance; and

using information regarding the conceptual lines and the currently calculated least distance to guide a needle stage relative to the breast.

25

30.   A method as in claim 29 wherein at least the upper body of the patient is prone while said x-ray views are taken.

31.   A method as in claim 29 wherein at least the upper body of the patient is upright while staid x-ray views are taken.

32.   A system comprising:

a breast platform and a compression plate movable relative to each other to compress and immobilize a patient's breast between them;

a digital x-ray receptor at one side of the platform and plate, and an x-ray source at the other side, said receptor and source mounted for rotation about the platform to image the breast from multiple angles;

a needle guidance stage selectively positioned between the x-ray source and the breast and carrying a needle oriented transversely to a plane conforming to a main plane of the compressed breast;

a computer coupled with the x-ray receptor to receive x-ray exposure information therefrom for at least two different views of the breast taken at different angles and to generate image information for corresponding images;

a computer monitor coupled with said computer to receive said image information and display images derived therefrom;

at least one marking device coupled with said computer to selectively place a first marker at a location in a first one of said displayed images and a second marker at a line on a second one of said displayed images to mark a plane intersecting the image;

said computer responding to said marking to produce a coordinate pair related to the marked location on the first image but only a single coordinate related to the plane marked on the second image;

said computer processing said pair of coordinates from the first image and said single coordinate from the second image to calculate a location of a target in the breast and provide information for positioning the needle guidance stage relative

to the breast and for depth of insertion of a needle into the breast.

33.   A system comprising:

a patient table having an opening for a breast of a prone patient;

a breast platform and a compression plate movable relative to each other under the table to compress and immobilize a breast protruding downwardly through said opening;

a digital x-ray receptor at one side of the platform and plate and an x-ray source at the other side, said receptor and source mounted for rotation about the platform and plate to image the breast in a scout view and one or more stereo views;

a needle guidance stage selectively positioned between the x-ray source and the breast and carrying a needle oriented transversely to a plane conforming to a main plane of the compressed breast;

a computer coupled with the x-ray receptor to receive x-ray exposure information therefrom for a scout view and one or more stereo view of the breast and to generate image information for corresponding scout and one or more stereo images;

a computer monitor coupled with said computer to receive said image information and display a scout image and one or more stereo images derived therefrom;

at least one marking device coupled with said computer to place a first marker at a location in the displayed scout image, and to place a second marker in each of the displayed one or more stereo images to mark on each a respective plane intersecting the respective stereo image;

said computer responding to said marking to produce a coordinate pair related to the marked location on the scout image but only a single coordinate related to each marked intersecting plane;

said computer processing said pair of coordinates from the scout image and said single coordinate related to one or more of said planes to calculate a three

27

dimensional position of at least one target in the breast and provide information for positioning the needle guidance stage relative to the breast and for depth of insertion of a needle into the breast.

34.   A system as in claim 33 in which said computer is configured to respond to said marking to calculate at least two positions or loci of positions of a target in the breast, and further to calculate at least one least distance between said positions or loci in the breast and provide information related thereto to said monitor, and wherein said monitor displays information regarding said at least one least distance in a live display.

35.   A system as in claim 34 in which said computer is configured to respond to new marks on at least one of said scout and stereo images to recalculate said at least one least distance and display recalculated results related thereto on said monitor.

36.   A system as in claim 34 in which said computer is configured to provide said information for positioning the needle guidance system and for selecting needle depth based in part on said calculated least distance.

37.   A system comprising:
      a breast platform and a compression plate movable relative to each other under the table to compress and immobilize a breast of a patient;
      an x-ray receptor at one side of the platform and plate and an x-ray source at the other side, said receptor and source mounted for rotation about the platform and breast to image the breast in views taken at different angles;
      a needle guidance stage selectively positioned between the x-ray source and the breast and carrying a needle pointing to the compressed breast;
      a display for x-ray images derived from said views;

a marking device for selecting and marking a location of interest on each of the images;

a computer coupled with the marking device and responsive to said selection of locations to produce two pairs of coordinates, each pair related to a respective selected locations;

said computer processing said two pairs of coordinates calculate, in three dimensions, at least two locations in the breast and to calculate at least one least distance between said locations in the breast;

a display device providing a live display of information related to said at least one least distance; and

said computer being configured to provide information to said needle guidance stage, based in part on information relating to said at least one least distance, for positioning the needle guidance stage relative to the breast and for a depth of insertion of a needle into the breast.

38.   A system as in claim 37 in which said computer is configured to respond to a new selection of a location on at least one of said images to recalculate said at least one least distance and display recalculated results on said display of results.

39.   A system as in claim 37 including a table supporting at least the upper body of the patient in a prone position.

40.   A system as in claim 37 in which said platform supports the breast while at least the upper body of the patient is upright.